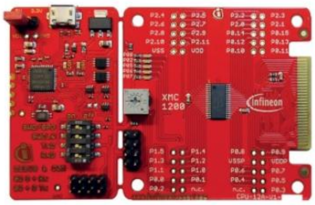
DAP miniWiggler V3

Part Number: KIT_XMC1X_AK_LED_001





Features

- XMC1200 Microcontroller with 200KB Flash
- Detachable SEGGER J-Link
- Colour LED Card
  - 3 RGB LEDs, 10mA
  - Connectivity: DALI, DMX, RF
  - Ambient light sensor
- White LED Card
  - 20 LEDs on 4 strings, 20mA
  - Connectivity: DALI, RF
  - Ambient light sensor
  - Temperature sensor

<u>PLEASE SEE THE FOLLOWING PAGES FOR THE USER MANUAL</u>

User Manuals Include:

- Board User's Manual XMC1200 CPU Card
- Board User's Manual Colour LED Card
- Board User's Manual White LED Card

XMC1200 CPU Card

For XMC1000 Family

CPU-12A-V1

XMC1200 CPU Card

Board User's Manual

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Table of Contents

List of Figures

List of Tables

Introduction

This document describes the features and hardware details of the XMC1200 CPU Card. This board is mounted with ARM® Cortex™-M0 based XMC1200 Microcontroller from Infineon Technologies AG and part of Infineon's XMC1000 offering of Kits

1 Overview

The XMC1200 CPU Card (CPU-12A-V1) houses the XMC1200 Microcontroller and a 2x30 pin edge for application expansion. This board along with application cards (e.g. LED Lighting Application Card) demonstrates the capabilities of XMC1200. The main use case for this board is to demonstrate the generic features of XMC1200 device including tool chain. The focus is safe operation under evaluation conditions. The board is neither cost nor size optimized and does not serve as a reference design.

1.1 Key Features

The XMC1200 CPU Card is equipped with the following features:
- XMC1200 (ARM® Cortex™-M0 based) Microcontroller, TSSOP38
- Connection to application cards via card edge connector
- Detachable SEGGER J-Link debugger and UART virtual COM port, with micro USB connector
- Five user LEDs
- Potentiometer, connected to analog input P2.5
- Power supply via Micro-USB connector

1.2 Block Diagram

Figure 1 shows the functional block diagram of the XMC1200 CPU Card.

Features include:
- On board Debugger, for downloading and debugging of application code
- Virtual com port for uart communication with terminal program e.g. Hyperterminal.
- 2x30 Card edge connector, for extension to application card e.g. LED Lighting and Motor Control Application Card.
- 5 User LEDs connected to GPIO P0.0, P0.2, P0.5, P0.6, P0.7
- Variable resistor R110 connected to Analog input P2.5
- All the pins of XMC1200 are accessible via the connector JP101, JP102, JP103 and JP104

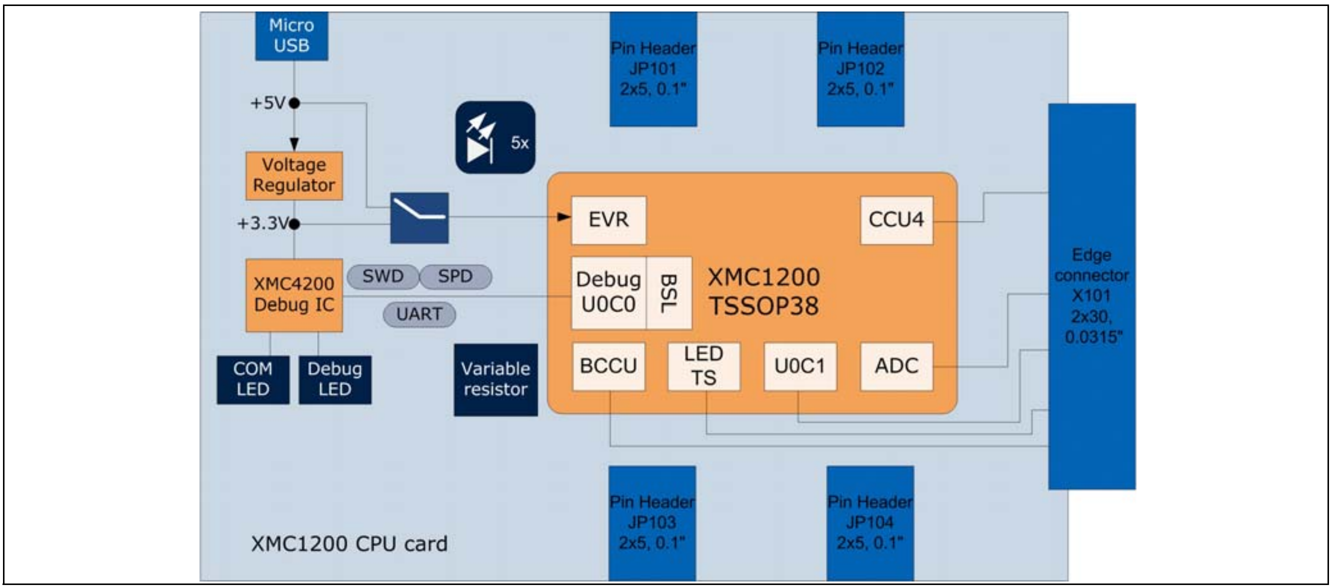


Figure 1 Block Diagram of XMC1200 CPU Card

2 Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

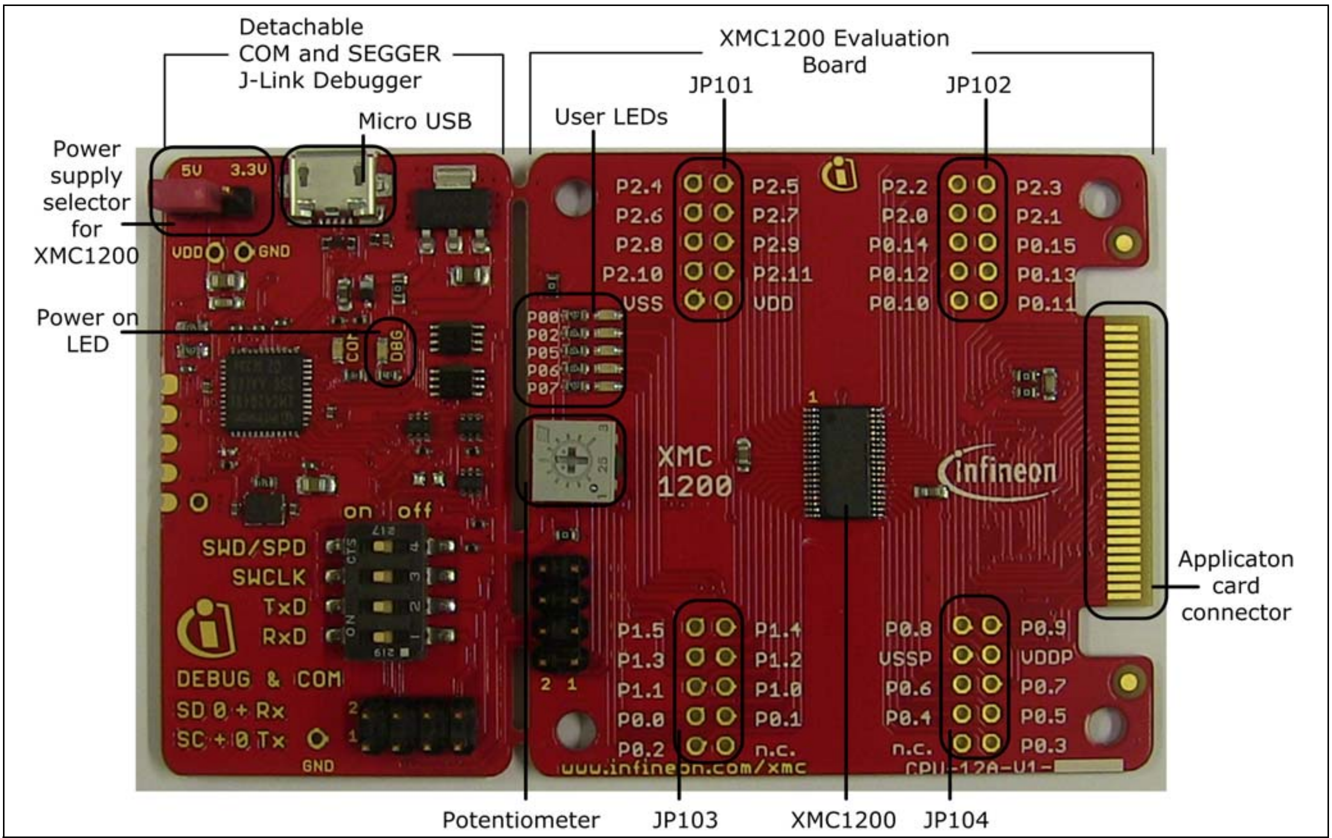


Figure 2 XMC1200 CPU Card

2.1 Power Supply

XMC1200 CPU Card is powered from the micro USB connector (5V); however, there is a current limit that can be drawn from the host PC through USB. If the CPU_12A_V1 board is used to drive other application card (e.g. Colour LED Card or White LED Card) and the total current required exceeds 500mA, then the board needs to be powered by external power supply connected to VDD and GND connection on board.

The XMC1200 device can operate by power supply of 1.8V till 5.5Vdc. On this board, 5Vdc is used to power the XMC1200 device. However, if user wants to power the XMC1200 device with 3.3Vdc, then, set Jumper at JP201 to 3.3V side.

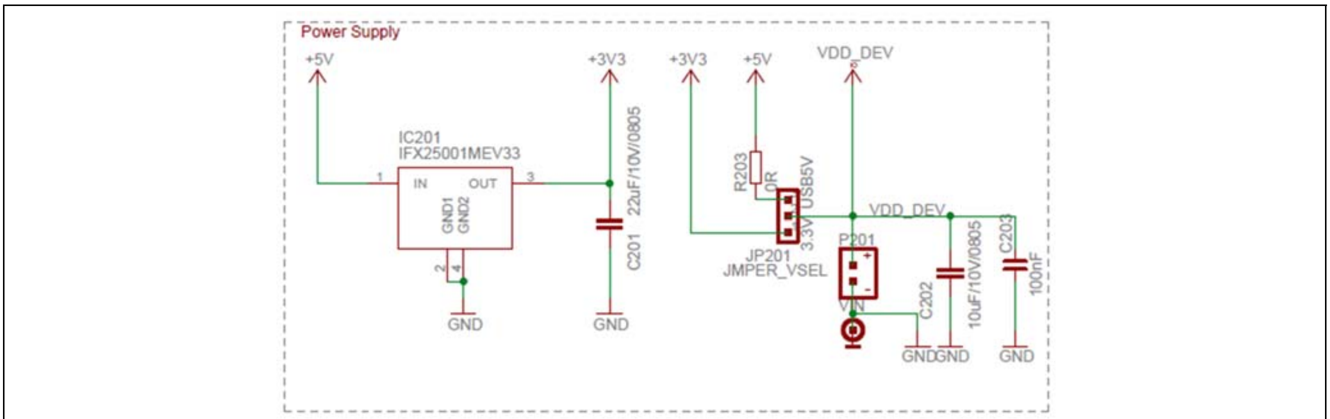


Figure 3 Power Supply circuit

2.2 Reset

XMC1200 does not have a reset pin, hence, user needs to unplug and replug the USB cable to achieve power-on with master reset to the XMC1200 device.

2.3 Clock Generation

No external clock source is required. XMC1200 has two internal oscillators DCO1 and DCO2. DCO1 has a clock output of 64MHz. DCO2 is used to generate the standby clock running at 32.768KHz which used for Real Time Clock too. The main clock, MCLK and fast peripherial clock, PCLK, are generated from DCO1's output.

2.4 Boot Option

After power-on with master reset, XMC1200 device will enter different boot mode depend on the BMI (Boot Mode Index) value stored in XMC1200's flash configuration sector 0 (CS0). The BMI value pre-programmed in the XMC1200 CPU Card is User mode with debug enabled, hence, XMC1200 CPU Card will start to run the application code in its embedded Flash after power on reset.

2.5 Debug Interface and virtual com port

XMC1200 CPU Card has on-board debugger which supports Serial Wire Debug (SWD) and Single Pin Debug (SPD) as debug interface. SPD is a proprietary debugging protocol from Infineon Technologies and it requires only 1 pin for debug communication. The debugger also provides a virtual COM port which support UART communication via P1.3 (rx-in) and P1.2 (tx-out) of XMC1200. There is a 2x5 pins Header Debug connector X201.

Table 1 Debug connector X201

Pin	Signal Name	XMC1200 Signal	Description
1	SWCLK	P0.15	SWD clock signal
2	SWD(SPD)	P0.14	SWD / SPD signal
3	VDDP	VDDP	+5V
4	GND	VSSP	Ground
5	GND	VSSP	Ground
6	VDDP	VDDP	+5V
7	PC_TXD	P1.3	UART data received
8	PC_RXD	P1.2	UART data transmit

2.6 LED

The port pins P0.0, P0.2, P0.5, P0.6 and P0.7 are connected to LED101, LED102, LED103, LED104 and LED105 respectively. The LED is turns on by output 'Low' at the port pin.

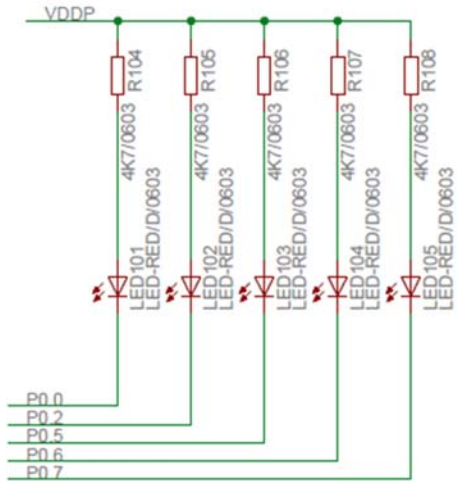


Figure 4 LEDs circuit

Table 2 LEDs Pinout

LED	XMC1200 Port Pin	Description
LED101	P0.0	Output 'Low' to on LED
LED102	P0.2	Output 'Low' to on LED
LED103	P0.5	Output 'Low' to on LED
LED104	P0.6	Output 'Low' to on LED
LED105	P0.7	Output 'Low' to on LED

2.7 Potentiometer

XMC1200 CPU Card provides a potentiometer R110 for ease of use and testing of the on-chip analog to digital converter. The potentiometer is connected to the analog input P2.5. The analog output of the potentiometer is the same the VDDP voltage supplied to the XMC1200 device.

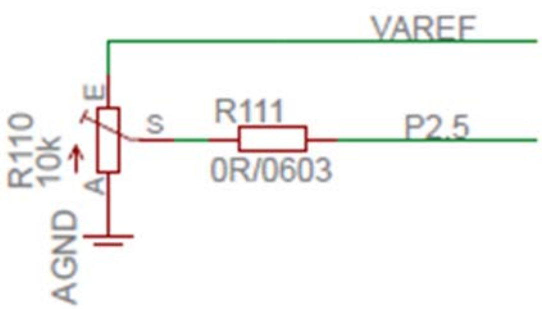


Figure 5 Potentiometer Circuit

2.8 Application Card connector

XMC1200 CPU Card has a 2x30 pins card edge connector. The mating connector is SAMTEC HSEC8-130-01-L-RA-XX.

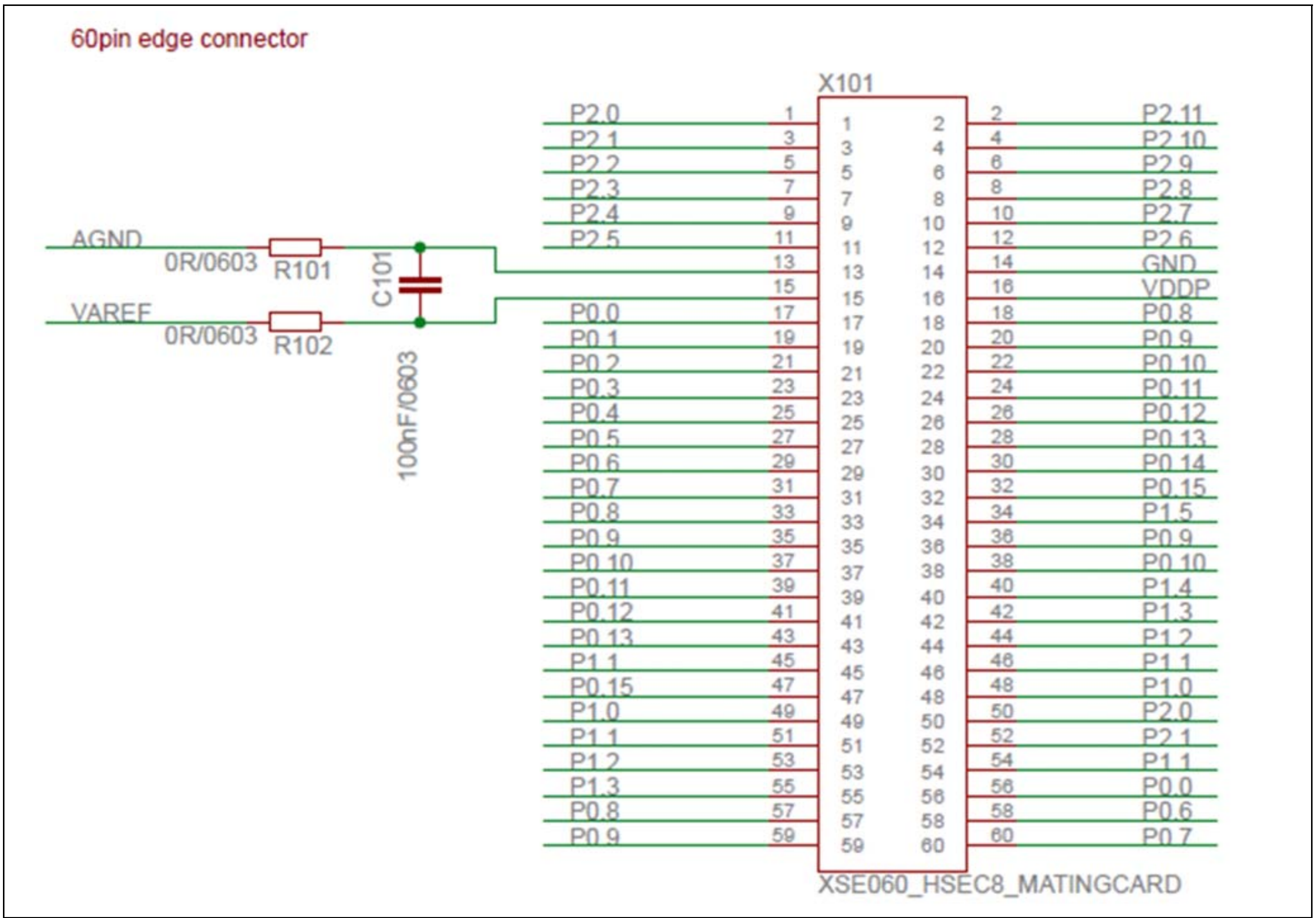


Figure 6 Pinout of the 2x30 pin edge connector

3 Production Data

3.1 Schematics

This chapter contains the schematics for the XMC1200 CPU Card:

- Figure 7: CPU, Pin Headers, Potentiometer and LED and 60pin Edge connector
- Figure 8: On-board Debugger, Power Supply

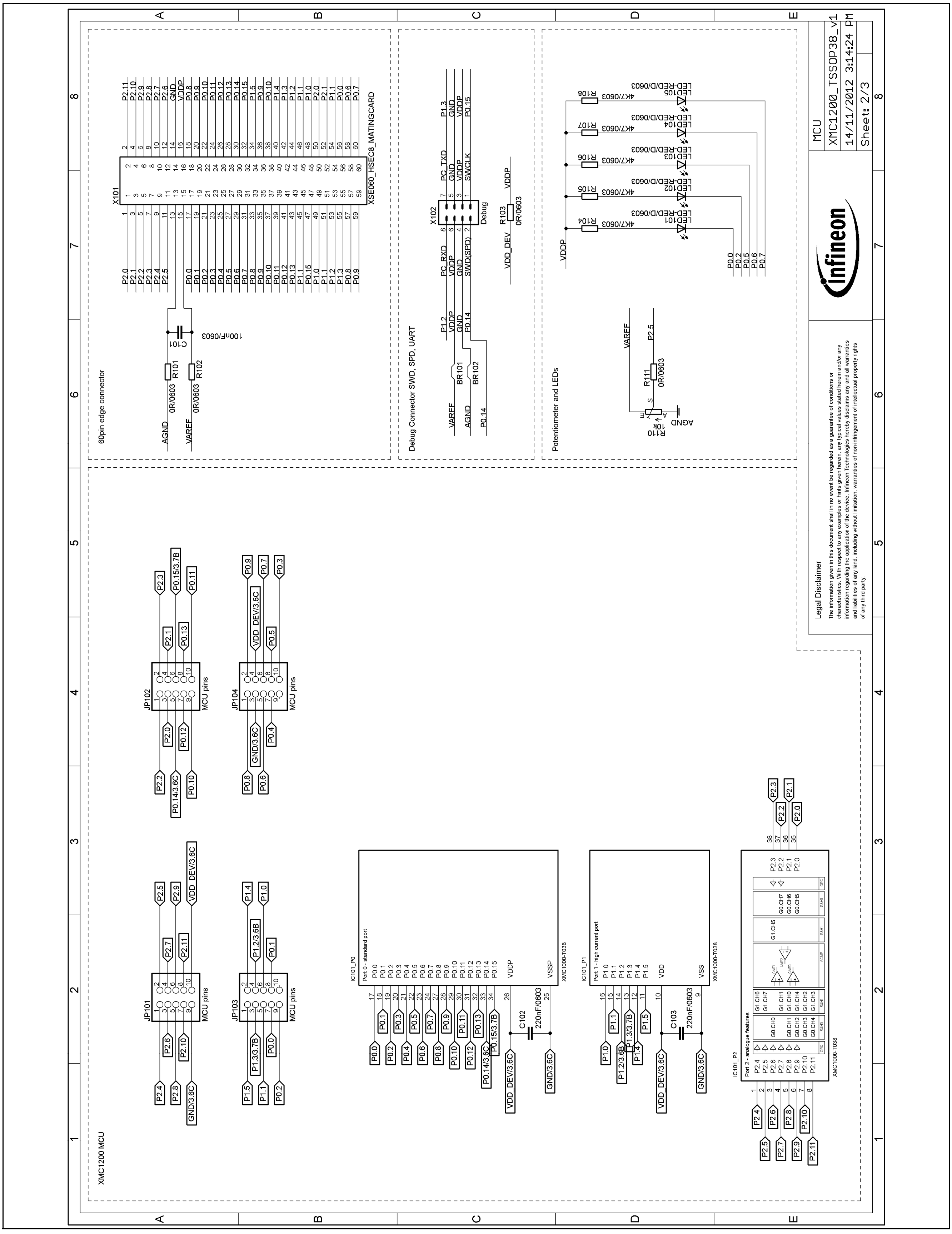


Figure 7 Schematic 1 of 2 XMC1200 CPU Card

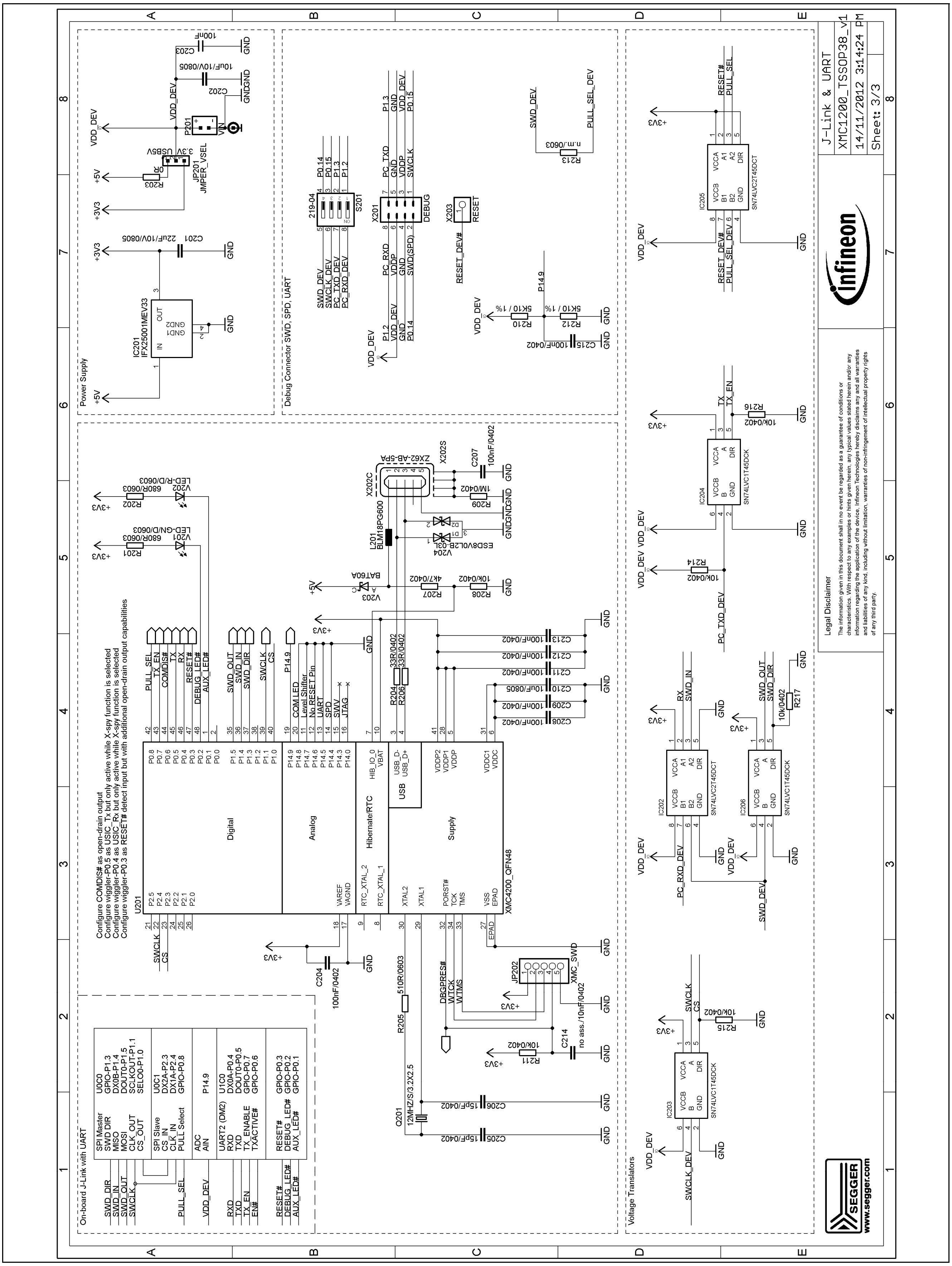


Figure 8 Schematic 2 of 2 XMC1200 CPU Card

3.2 Layout and Geometry

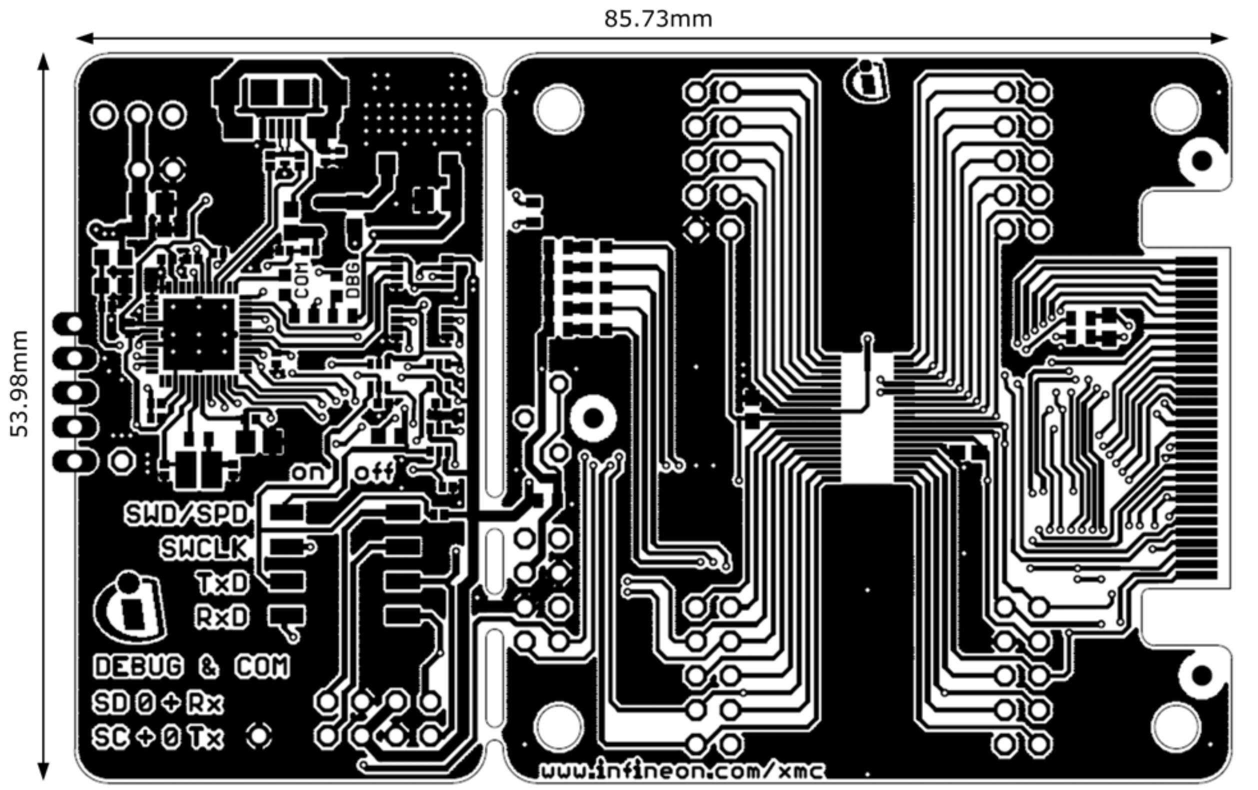


Figure 9 XMC1200 CPU Card layout and geometry

3.3 Bill of Material

Table 3 XMC1200 CPU Card

No.	Qty	Value	Device	Reference Designator
1	1	100nF/10V/10%/0603	Capacitor	C101
2	1	220nF/10V/10%/0603	Capacitor	C102
3	1	220nF/10V/10%/0603	Capacitor	C103
4	1	22uF/10V/10%/0805	Capacitor	C201
5	1	10uF/10V/10%/0805	Capacitor	C202
6	1	100nF/10V/10%/0603	Capacitor	C203
7	1	100nF/10V/10%/0402	Capacitor	C204
8	1	15pF/10V/10%/0402	Capacitor	C205
9	1	15pF/10V/10%/0402	Capacitor	C206
10	1	100nF/10V/10%/0402	Capacitor	C207
11	1	100nF/10V/10%/0402	Capacitor	C208
12	1	100nF/10V/10%/0402	Capacitor	C209
13	1	10uF/10V/10%/0805	Capacitor	C210
14	1	100nF/10V/10%/0402	Capacitor	C211
15	1	100nF/10V/10%/0402	Capacitor	C212
16	1	100nF/10V/10%/0402	Capacitor	C213

No.	Qty	Value	Device	Reference Designator
17	1	100nF/10V/10%/0402	Capacitor	C215
18	1	SN74LVC2T45DCT	Resistor	IC202
19	1	SN74LVC1T45DCK	Resistor	IC203
20	1	SN74LVC1T45DCK	Resistor	IC204
21	1	SN74LVC2T45DCT	Resistor	IC205
22	1	SN74LVC1T45DCK	Resistor	IC206
23	1	BLM18PG600	Ferrite Bead	L201
24	1	LED-RED/D/0603	Red ChipLED	LED101
25	1	LED-RED/D/0603	Red ChipLED	LED102
26	1	LED-RED/D/0603	Red ChipLED	LED103
27	1	LED-RED/D/0603	Red ChipLED	LED104
28	1	LED-RED/D/0603	Red ChipLED	LED105
29	1	12MHZ/S/3.2X2.5	Quarz	Q201
30	1	0R/0603	Resisto	R101
31	1	0R/0603	Resistor	R102
32	1	0R/0603	Resistor	R103
33	1	4K7/0603	Resistor	R104
34	1	4K7/0603	Resistor	R105
35	1	4K7/0603	Resistor	R106
36	1	4K7/0603	Resistor	R107
37	1	4K7/0603	Resistor	R108
38	1	10k	Potentiometer	R110
39	1	0R/0603	Resistor	R111
40	1	680R/0603	Resistor	R201
41	1	680R/0603	Resistor	R202
42	1	33R/0402	Resistor	R204
43	1	510R/0603	Resistor	R205
44	1	33R/0402	Resistor	R206
45	1	4k7/0402	Resistor	R207
46	1	10k/0402	Resistor	R208
47	1	1M/0402	Resistor	R209
48	1	5K10/1%/0603	Resistor	R210
49	1	10k/0402	Resistor	R211
50	1	5K10/1%/0603	Resistor	R212
51	1	10k/0402	Resistor	R214
52	1	10k/0402	Resistor	R215
53	1	10k/0402	Resistor	R216
54	1	10k/0402	Resistor	R217
55	1	JMPER_VSEL	1x3 Header	JP201
56	1	JUMPER	Red	JP201a
57	1	219-04	Switch - DIL	S201
58	1	MA04-2	2x4 Header	X102
59	1	MA04-2	2x4 Header	X202

No.	Qty	Value	Device	Reference Designator
60	1	LED-GN/D/0603	ChipLED	V201
61	1	LED-R/D/0603	ChipLED	V202
62	1	ESD8V0L2B-03L	Diode	V204
63	1	ZX62-AB-5PA	Micro-USB	X202
64	1	XMC1200-T038	Microcontroller, Infineon	IC101
65	1	IFX25001MEV33	3V3 regulator, Infineon	IC201
66	1	XMC4200_QFN48	Microcontroller, Infineon	U201
67	1	BAT60A	Diode	V203
68	1	BRIDGE10X10	BRIDGE10	BR101
69	1	BRIDGE10X10	BRIDGE10	BR102
70	1	no ass./10nF/0402	Capacitor	C214
71	1	no ass./MCU	2x5 pin header	JP101
72	1	no ass./MCU	2x5 pin header	JP102
73	1	no ass./MCU	2x5 pin header	JP103
74	1	no ass./MCU	2x5 pin header	JP104
75	1	no ass./XMC_SWD	1x5 pin header	JP202

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Published by Infineon Technologies AG

Colour LED Card

For XMC1000 Family

inLight_RGB_V3

Colour LED Card

Board User's Manual

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Table of Contents

List of Figures

List of Tables

Introduction

This document describes the features and hardware details of the Colour LED Card (inLight_RGB_v3) designed to work with Infineon‟s XMC1200 CPU Card. This board is part of Infineon‟s XMC1000's LED Lighting Application Kit.

1 Overview

The Colour LED Card is an application expansion card of XMC1000 LED Lighting Application Kit. This application card along with a XMC1200 CPU Card demonstrates the LED lighting capabilities of XMC1200/XMC1300. The main use case for this application card is to demonstrate the smooth colour control of XMC1200/XMC1300 device including the toolchain. The focus is safe operation under evaluation conditions. The board is not cost optimized and cannot be seen as reference design.

1.1 Key Features

The Colour LED Card is equipped with the following features

- Connection to XMC1200/XMC1300 CPU Cards via 2x30 pins (0.8mm pitch) SAMTEC HSEC8 connector
- RGB control of three independent LEDs (OSRAM LRTB-G6SF)
- DALI interface with isolation
- DMX512 interface without isolation
- Ambient light sensing
- 433MHz RF receiver
- +5V Power supply via SAMTEC 2x30pins connector
- +12V external connection to supply power to the 3 LEDs

1.2 Block Diagram

Figure 1 shows the block diagram of the Colour LED Card in connection with XMC1200 CPU Card. There are following blocks:

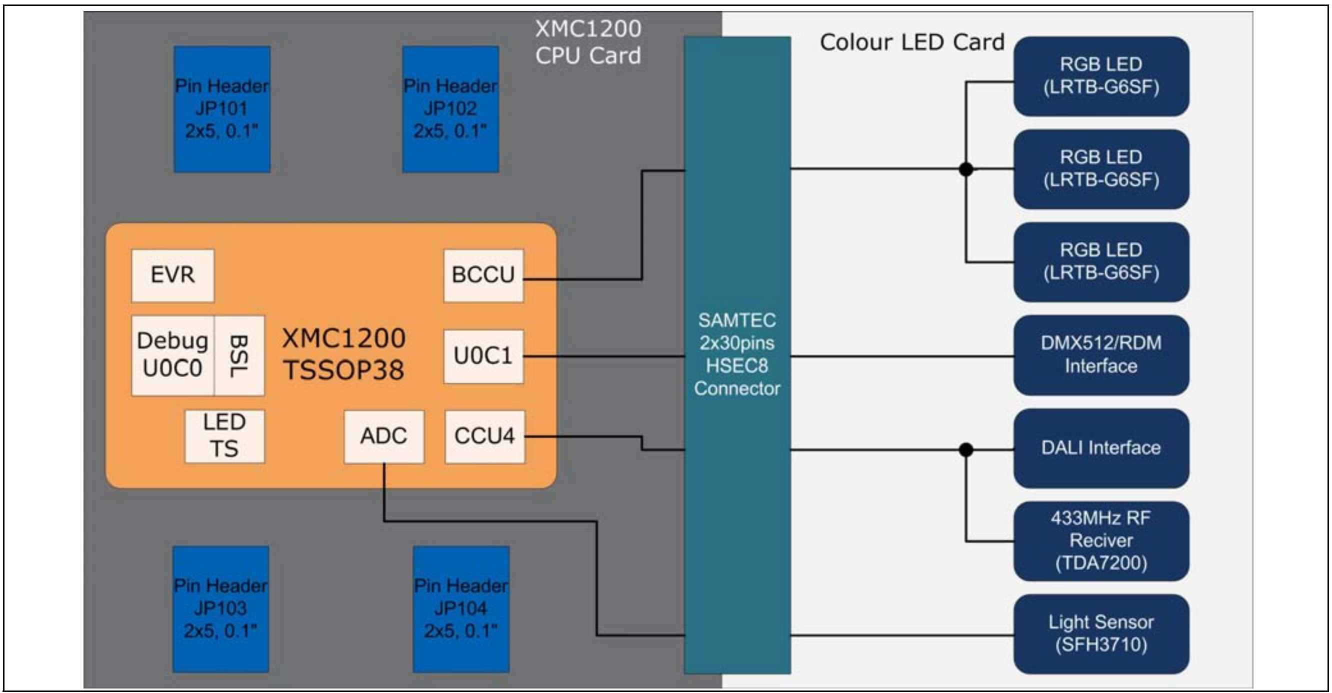


Figure 1 Block Diagram of Colour LED Card in connection with XMC1200 CPU Card

2 Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

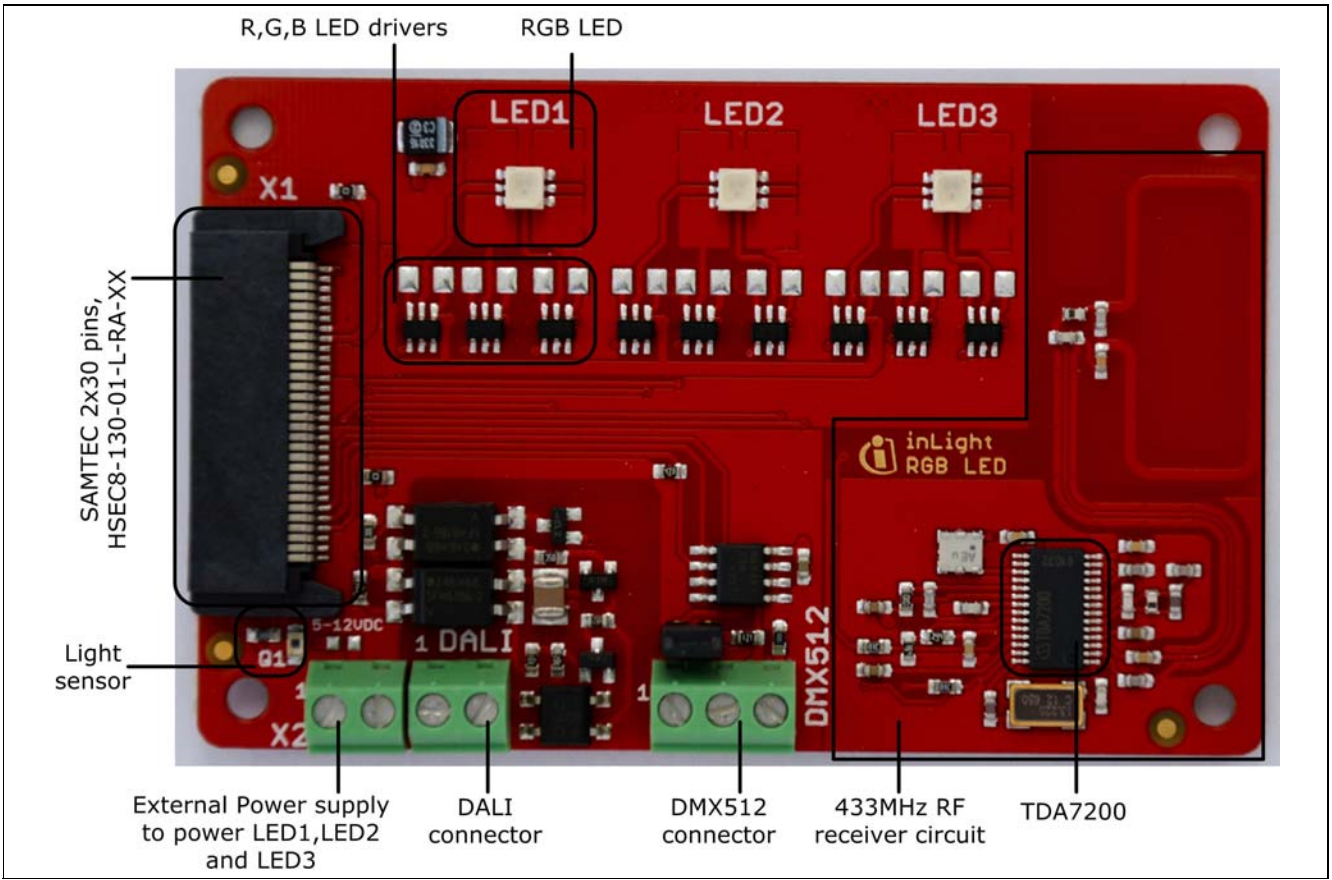


Figure 2 Colour LED Card

2.1 RGB LEDs

The Colour LED Card supports individual control of three OSRAM RGB LEDs (LRTB-G6SF), namely LED1, LED2, LED3, on board.The forward voltage V_F is 2 ~ 3.2 V @ I_F=20mA.
The card implements brightness and color control through BCCU module of XMC1200. The BCCU module has 9 channels to drive 9 LED drivers (BCR421) which control the current flow through the Red, Green and Blue LEDs of the three OSRAM LED module.

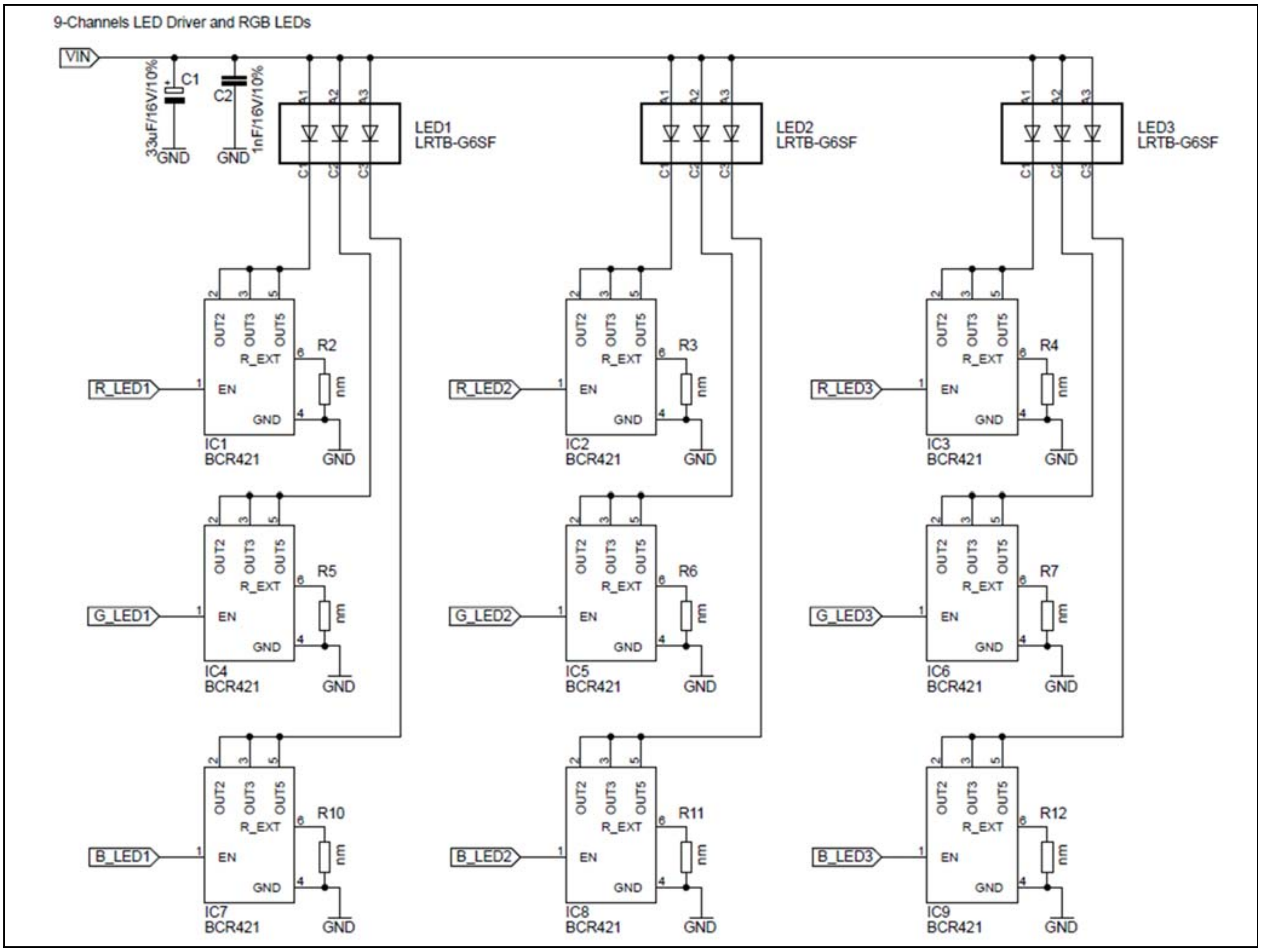


Figure 3 9 channels from BCCU module to control the three RGB LED modules

Table 1 shows the connection of the BCCU signals to the SAMTEC 2x30pins connector.

Table 1 BCCU signal connection to the SAMTEC 2x30pins Connector

Pin No.	Signal Name	Description
19	B_LED1	Blue channel of LED1
25	R_LED1	Red channel of LED1
27	R_LED2	Red channel of LED2
29	G_LED2	Green channel of LED2
31	B_LED2	Blue channel of LED2
33	R_LED3	Red channel of LED3
35	G_LED3	Green channel of LED3
37	B_LED3	Blue channel of LED3
39	G_LED1	Green channel of LED1

2.2 Digital Addressable Lighting Interface (DALI)

The Colour LED Card supports DALI interface on board with two optocoupler (SFH6186-2) which provide level shifting and voltage isolation between the DALI network and the microcontroller's power supply. The DALI connector X3 consists of a DATA+ and DATA- signal pair.

Note: Please remove R105 of XMC1200 CPU Card when using DALI for receiving data.

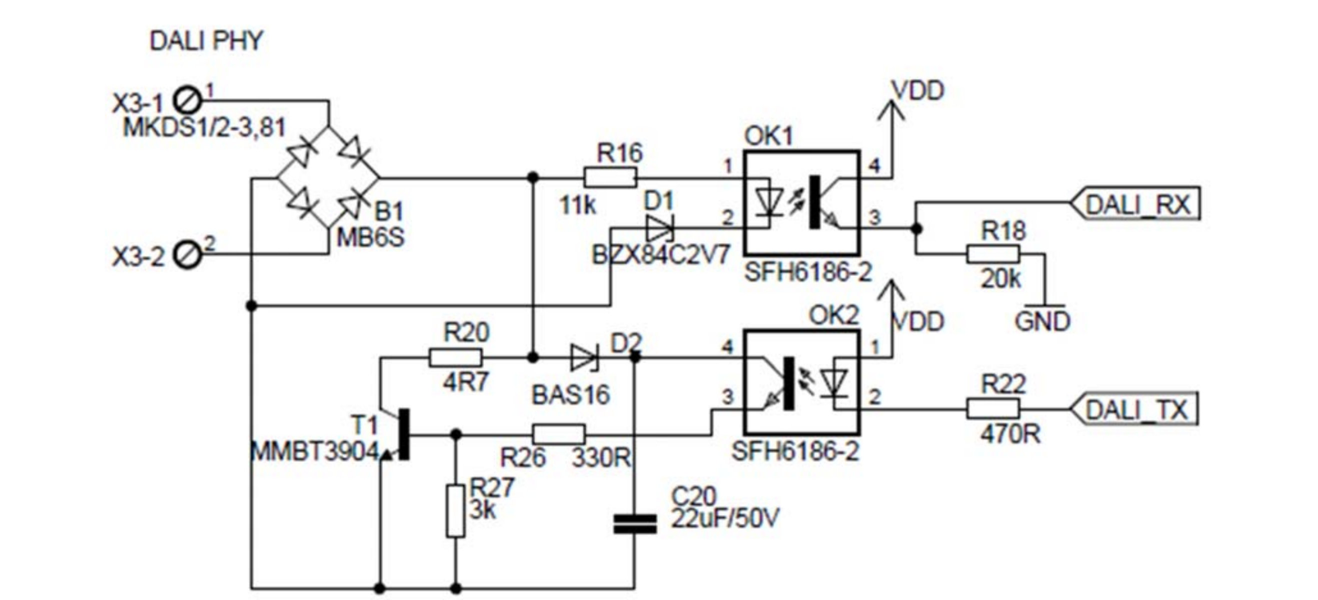


Figure 4 DALI PHY circuit

Table 2 DALI signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
21	DALI_RX	DALI data received
23	DALI_TX	DALI data transmit

2.3 DMX512/ Remote Device Management (RDM)

The Colour LED Card supports DMX512 interface on board with RS-485 transceiver (MAX481CSA). The DMX512 connector X4 consists of a 120 ohms termination resistor between DATA+ and DATA- and a Ground pin.

Note: There is NO isolation between external DMX512 signals and the XMC1200’s DMX512 interface signals.

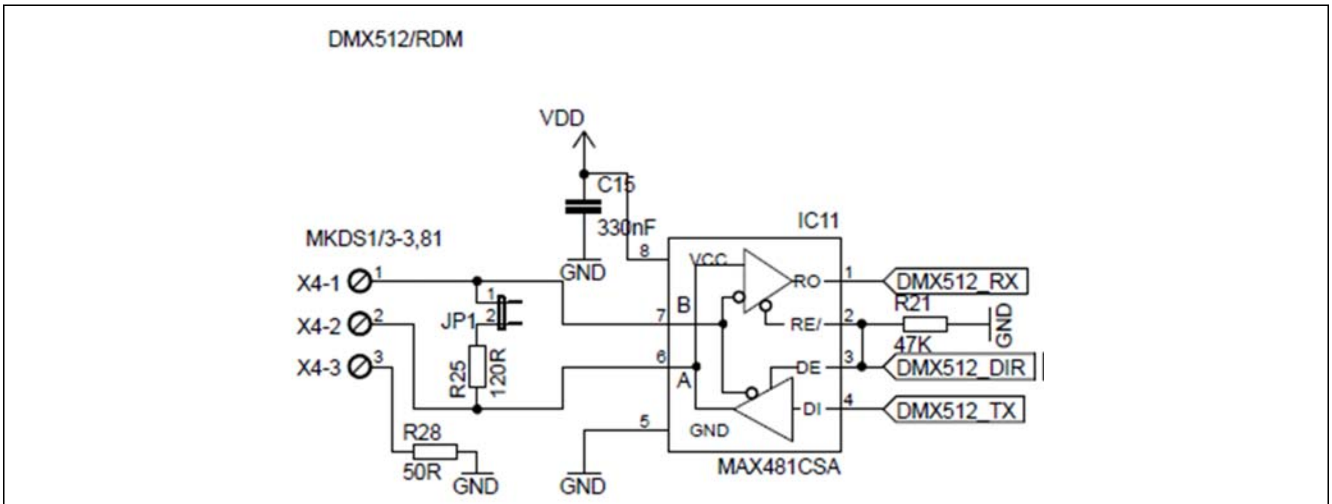


Figure 5 DMX512/RDM Circuit

Table 3 shows the connection of the DMX512 signals to the SAMTEC 2X30pins connector.

Table 3 DMX512 signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
50	DMX512_TX	DMX512 data transmit out
52	DMX512_RX	DMX512 data receive in
54	DMX512_DIR	Transceiver direction control

2.4 433MHz RF Receiver

The Colour LED Card supports 433MHz remote control system via a 433MHz RF Receiver (TDA7200) that is connected to the CPU Card via the SAMTEC 2X30pins connector.

Note: Please remove R104 of XMC1200/XMC1300 CPU Card when using the 433MHz RF receiver.

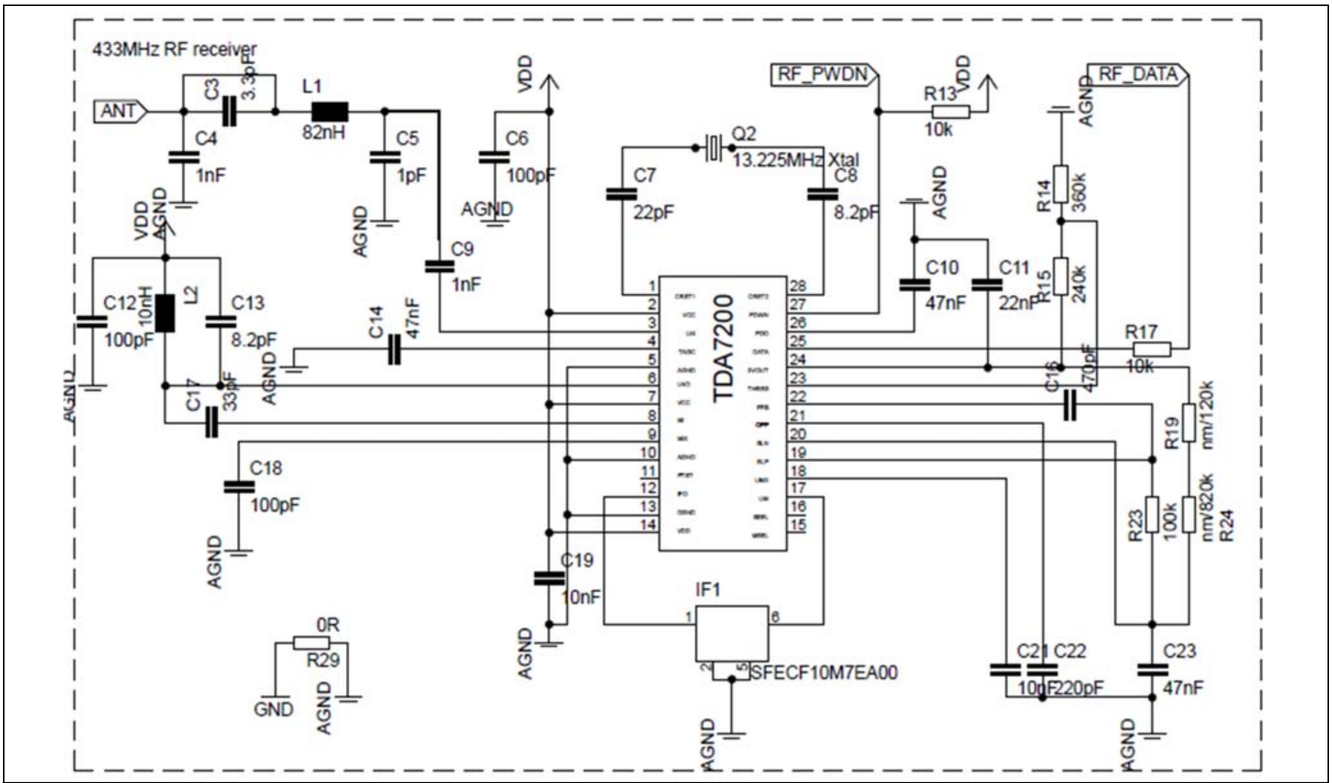


Figure 6 433MHz RF receiver circuit

Table 4 433MHz RF receiver signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
17	RF_DATA	RF Data In
43	RF_PWDN	Tied to 'High' to enable receiver

2.5 Light Sensor

The Colour LED Card supports ambient light sensing on board with NPN Phototransistor (SFH3710). The voltage output AMB_LT will be measured by the ADC module.

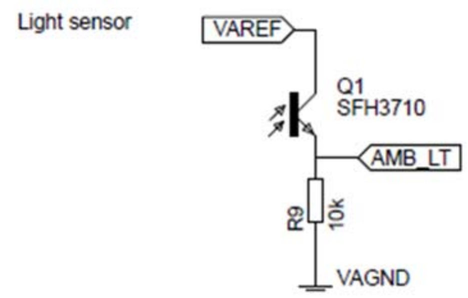


Figure 7 Ambient Light Sensing Circuit

Table 5 shows the connection of the DMX512 signals to the SAMTEC 2X30pins connector.

Table 5 Light sensing signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
2	AMB_LT	Light sensing output

2.6 Power

Power input (5V) to the Application card is supported through the SAMTEC 2x30pins connector. VAREF and VAGND supply power to 433MHz RF Receiver and Light sensing transistor. VDD and GND provide power to the DALI and DMX512 circuitry.

VIN supply power to the three RGB LEDs and is shorted to VDD via a zero ohm resistor R1. However, user could also connect VIN to external power supply by removed R1, soldered zero ohm resistor R8 and connected external power supply to connector X2.

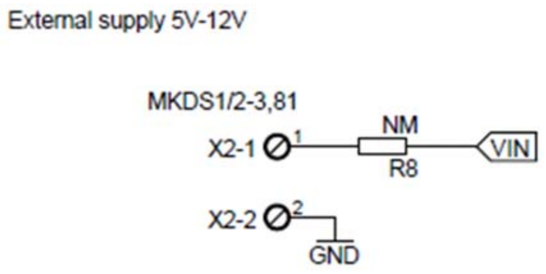


Figure 8 VIN External Power Supply

Table 6 Power and ground signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
13	VAGND	Analog ground
14	GND	Digital ground
15	VAREF	Analog VDD +5V
16	VDD	Digital VDDP +5V

2.7 2x30pins SAMTEC connector

The SAMTEC connector of the Colour LED Card interfaces its signals to XMC1200 CPU Card.

XMC1200_TSSOP38 Board>>		P2.11	P2.10	P2.9	P2.8	P2.7	P2.6	VSSP	VDDP	P0.8	P0.9	P0.10	P0.11	P0.12	P0.13	P0.14
XMC1200_TSSOP38 Board>>		SH0.IN3						VSSP	VDDP							
CONpins>>	Colour LED Card	AMB_LT						GND	VDD							
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
		1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
CONpins>>								VAGND	VAREF	RF_DATA	B_LED1	DALI_RX	DALI_TX	R_LED1	R_LED2	G_LED2
XMC1200_TSSOP38 Board>>								VSS	VDDP	CCU4.OUT0	BCCU.OUT8	CCU4.OUT2	CCU4.OUT3	BCCU.OUT0	BCCU.OUT1	BCCU.OUT2
XMC1200_TSSOP38 Board>>		P2.0	P2.1	P2.2	P2.3	P2.4	P2.5	VSS	VDDP	P0.0	P0.1	P0.2	P0.3	P0.4	P0.5	P0.6

XMC1200_TSSOP38 Board>>	P0.15	P1.5	P0.9	P0.10	P1.4	P1.3	P1.2	P1.1	P1.0	P2.0	P2.1	P1.1	P0.0	P0.6	P0.7
XMC1200_TSSOP38 Board>>										U0C0.TxRx	U0C0.RxTx	U0C0.DOUT1			
CONpins>>										DMX512_TX	DMX512_RX	DMX512_DIR			
	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
CONpins>>	B_LED2	R_LED3	G_LED3	B_LED3	G_LED1		RF_PWDN								
XMC1200_TSSOP38 Board>>	BCCU.OUT3	BCCU.OUT4	BCCU.OUT5	BCCU.OUT6	BCCU.OUT7		LTS0.C2								
XMC1200_TSSOP38 Board>>	P0.7	P0.8	P0.9	P0.10	P0.11	P0.12	P0.13	P1.1	P0.15	P1.0	P1.1	P1.2	P1.3	P0.8	P0.9

Figure 9 SAMTEC 2x30pins SAMTEC connector

3 Production Data

3.1 Schematics

This chapter contains the schematics for the Colour LED Card:

- SAMTEC Connector, Power, 9 channels LED driver, DALI interface, DMX512/RDM interface, 433MHz RF Receiver.

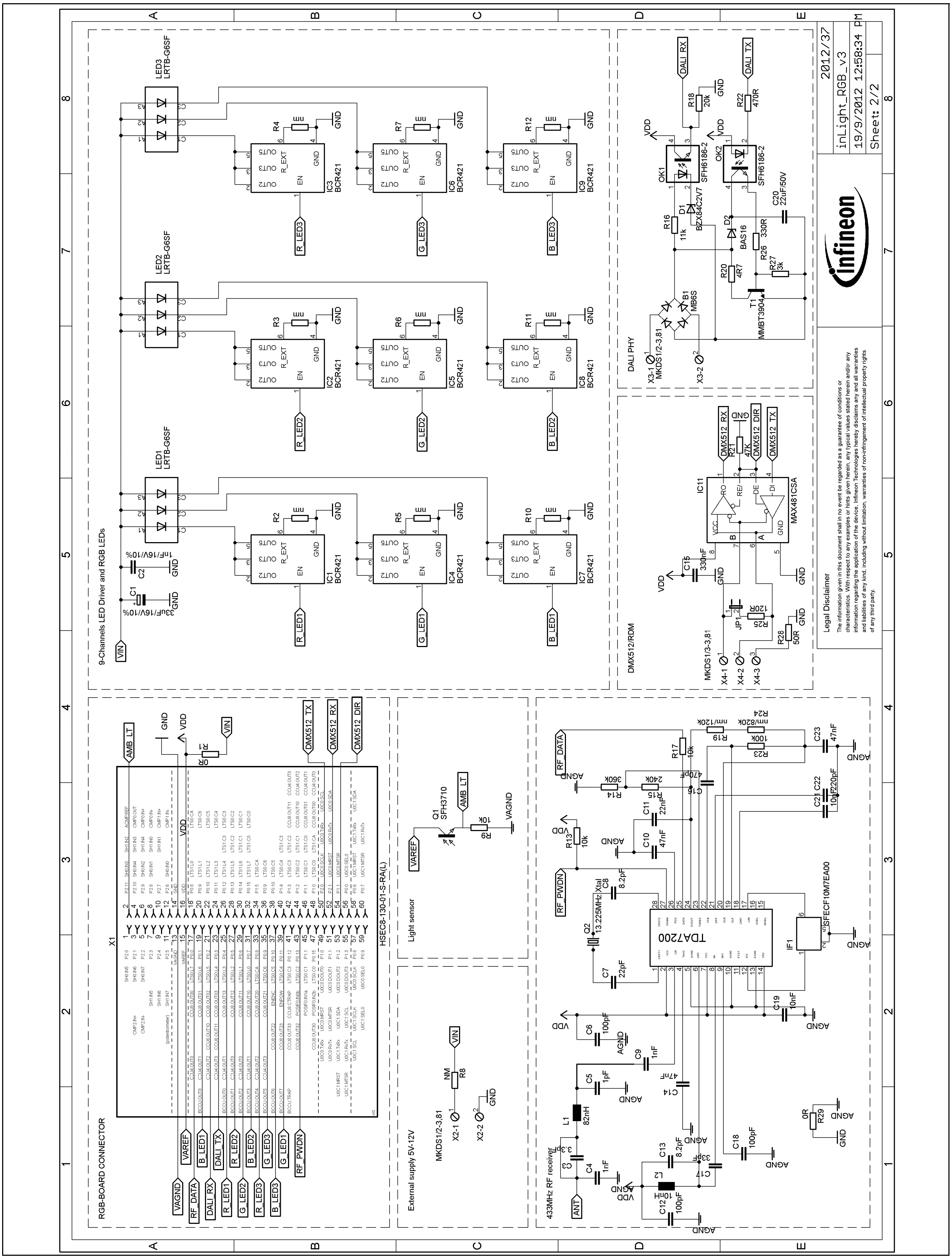


Figure 10 Schematic of Colour LED Card

3.2 Layout and Geometry

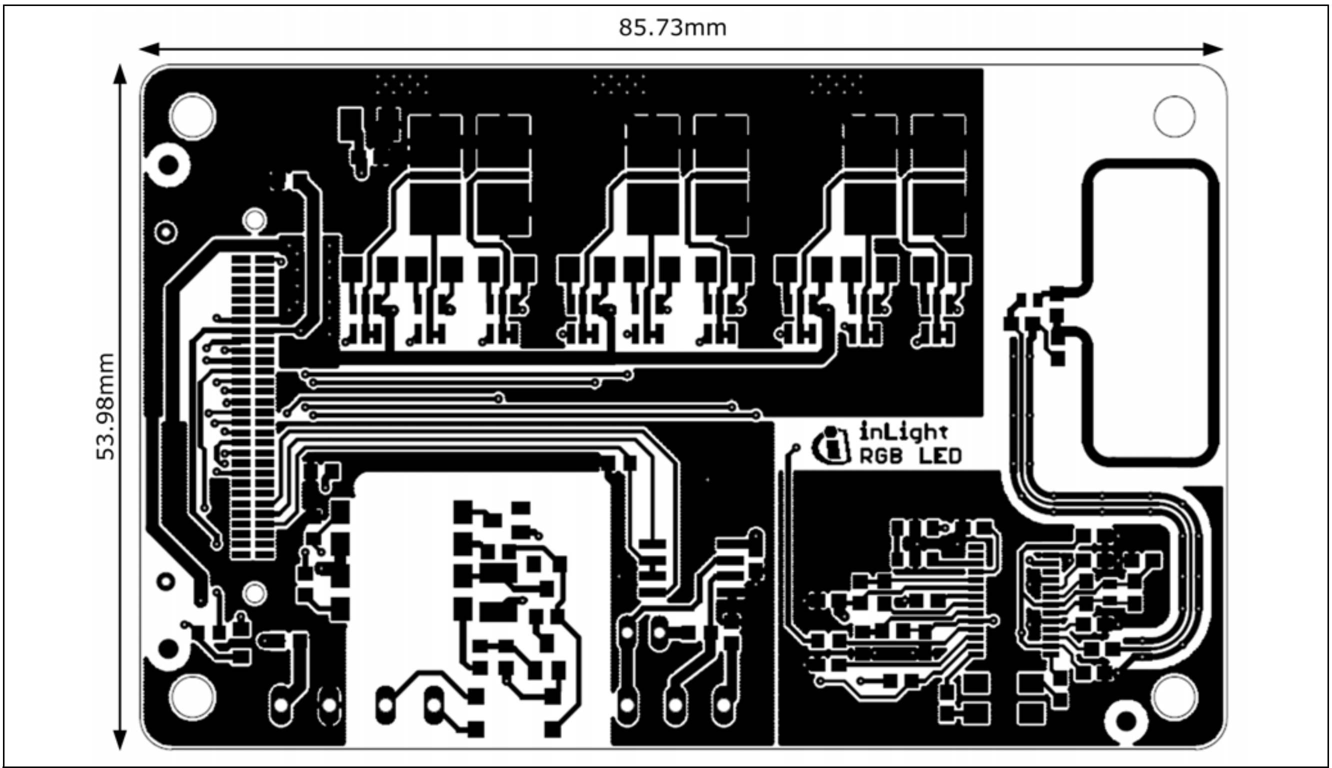


Figure 11 Colour LED Card layout and geometry

3.3 Bill of Materials

Table 7 Colour LED Card BOM

No.	Qty	Value	Device	Reference Designator
1	1	HSEC8-130-01-L-RA	HSEC8 socket, SAMTEC	X1
2	3	MKDS1/2-3,81	3.81mm pitch, 2 way, Phoenix	X2,X3,X4
3	1	MB6S	Bridge Rectifier, Fairchild	B1
4	1	22uF/50V/10%/1210	Capacitor	C20
5	1	33uF/16V/10%/SMC_B	Electrolytic capacitor	C1
6	1	1pF/16V/10%/0603	Capacitor	C5
7	1	3.3pF/16V/10%/0603	Capacitor	C3
8	2	8.2pF/16V/10%/0603	Capacitor	C8,C13
9	1	33pF/16V/10%/0603	Capacitor	C17
10	3	100pF/16V/10%/0603	Capacitor	C6,C12,C18
11	1	220pF/16V/10%/0603	Capacitor	C22
12	1	470pF/16V/10%/0603	Capacitor	C16
13	3	1nF/16V/10%/0603	Capacitor	C2,C4,C9

No.	Qty	Value	Device	Reference Designator
14	2	10nF/16V/10%/0603	Capacitor	C19,C21
15	2	22nF/16V/10%/0603	Capacitor	C7,C11
16	3	47nF/16V/10%/0603	Capacitor	C10,C14,C23
17	1	330nF/10V/10%/0603	Capacitor	C15
18	1	BZX84C2V7/SOT23	Zener diode 2.7V, NXP	D1
19	1	BAS16/TO236	Diode	D2
20	9	BCR421/SC74	LED driver, Infineon	IC1,IC2,IC3,IC4,IC5,IC6,IC7,IC8,IC9
21	1	TDA7200/TSSOP28	ASK/FSK receiver, Infineon	IC10
22	1	MAX481CSA/SO08	RS-485 transceiver, Maxim	IC11
23	1	SFECF10M7EA00	10.7MHz BP filter, Murata	IF1
24	1	2.54mm pitch header, 2way	JUMPER	JP1
25	1	10nH/0603	Inductor	L2
26	1	82nH/0603	Inductor	L1
27	3	LRTB-G6SF/P-LCC-6	RGB LED, OSRAM	LED1,LED2,LED3
28	1	SFH6186-2	Optocoupler, Vishay	OK1,OK2
29	1	SFH3710	Light detector, OSRAM	Q1
30	1	13.225MHz Xtal	Crystal	Q2
31	2	0R/0603	Resistor	R1,R29
32	12	no ass./0603	Resistor	R2,R3,R4,R5,R6,R7,R8,R10,R11,R12,R19,R24
33	3	10K/0603	Resistor	R9,R13,R17
34	1	360K/0603	Resistor	R14
35	1	240K/0603	Resistor	R15
36	1	11K/0603	Resistor	R16
37	1	20K/0603	Resistor	R18
38	1	4R7/0603	Resistor	R20
39	1	47K/0603	Resistor	R21
40	1	470R/0603	Resistor	R22
41	1	100K/0603	Resistor	R23
42	1	120R/0603	Resistor	R25
43	1	330R/0603	Resistor	R26
44	1	3K/0603	Resistor	R27
45	1	50R/0603	Resistor	R28
46	1	MMBT3904/SOT23	NPN Transistor	T1

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White LED Card

For XMC1000 Family

inLight_WhiteLED_V4

White LED Card

Board User's Manual

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Table of Contents

List of Figures

List of Tables

Introduction

This document describes the features and hardware details of the White LED Card (inLight_WhiteLED_v4) designed to work with Infineon"s XMC1200 CPU Card. This board is part of Infineon's XMC1000 LED Lighting Application Kit.

1 Overview

The White LED Card is an application expansion card of XMC1000 LED Lighting Application Kit. The White LED Card along with a XMC1200 CPU Card demonstrates the LED lighting capabilities of XMC1200. The main use case for this application card is mainly to demonstrate the smooth brightness control of XMC1200 device including the toolchain. The focus is safe operation under evaluation conditions. The board is not cost optimized and cannot be seen as reference design.

1.1 Key Features

The White LED Card is equipped with the following features

- Connection to XMC1200 CPU Card via 2x30 pins (0.8mm pitch) SAMTEC HSEC8 connector
- Brightness control of four LED strings
- DALI interface with isolation
- Temperature sensing
- Ambient light sensing
- 433MHz RF receiver
- +5V Power supply via SAMTEC 2x30pins connector
- +24V external connection to supply power to the four LED drivers (BCR450)

1.2 Block Diagram

Figure 1 shows the block diagram of the White LED Card. There are following blocks:

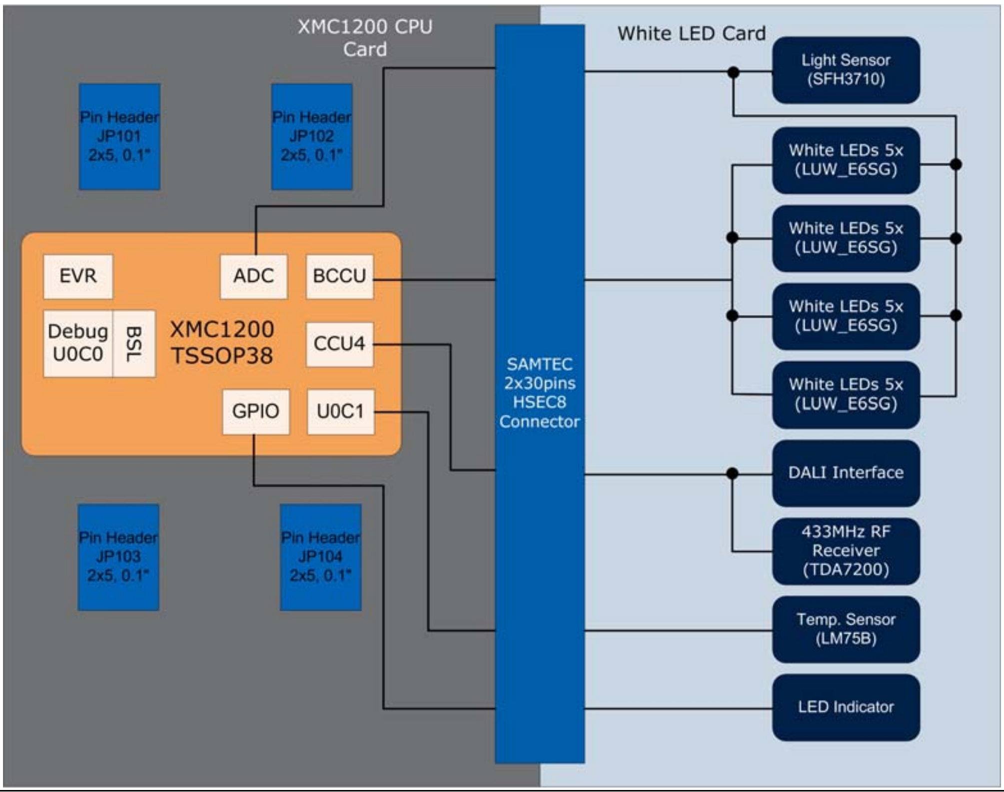


Figure 1 Block Diagram of White LED Card in connection with XMC1200 CPU Card

2 Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

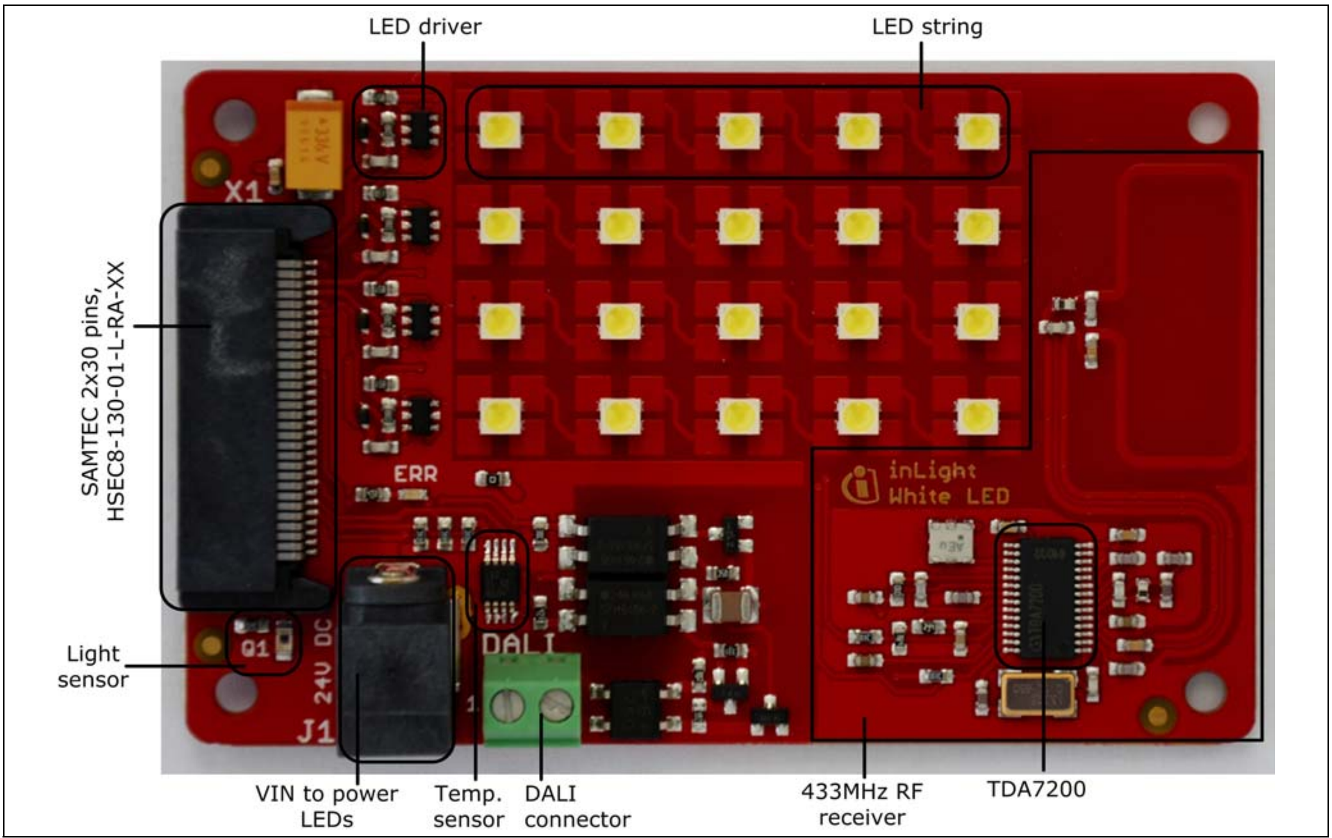


Figure 2 White LED Card

2.1 White LEDs

The White LED Card supports brightness control of four LED strings, each string consists of five White LEDs (LUW_E6SG) on board.The forward voltage V_F is 3.3 V @ I_F=30mA.
The card implements brightness control through BCCU module of XMC1200. The BCCU module used four channels to drive four LED drivers (BCR450) which control the current flow through the White LED string. The +24V power supply to the LED drivers is provided from an external connector J1.

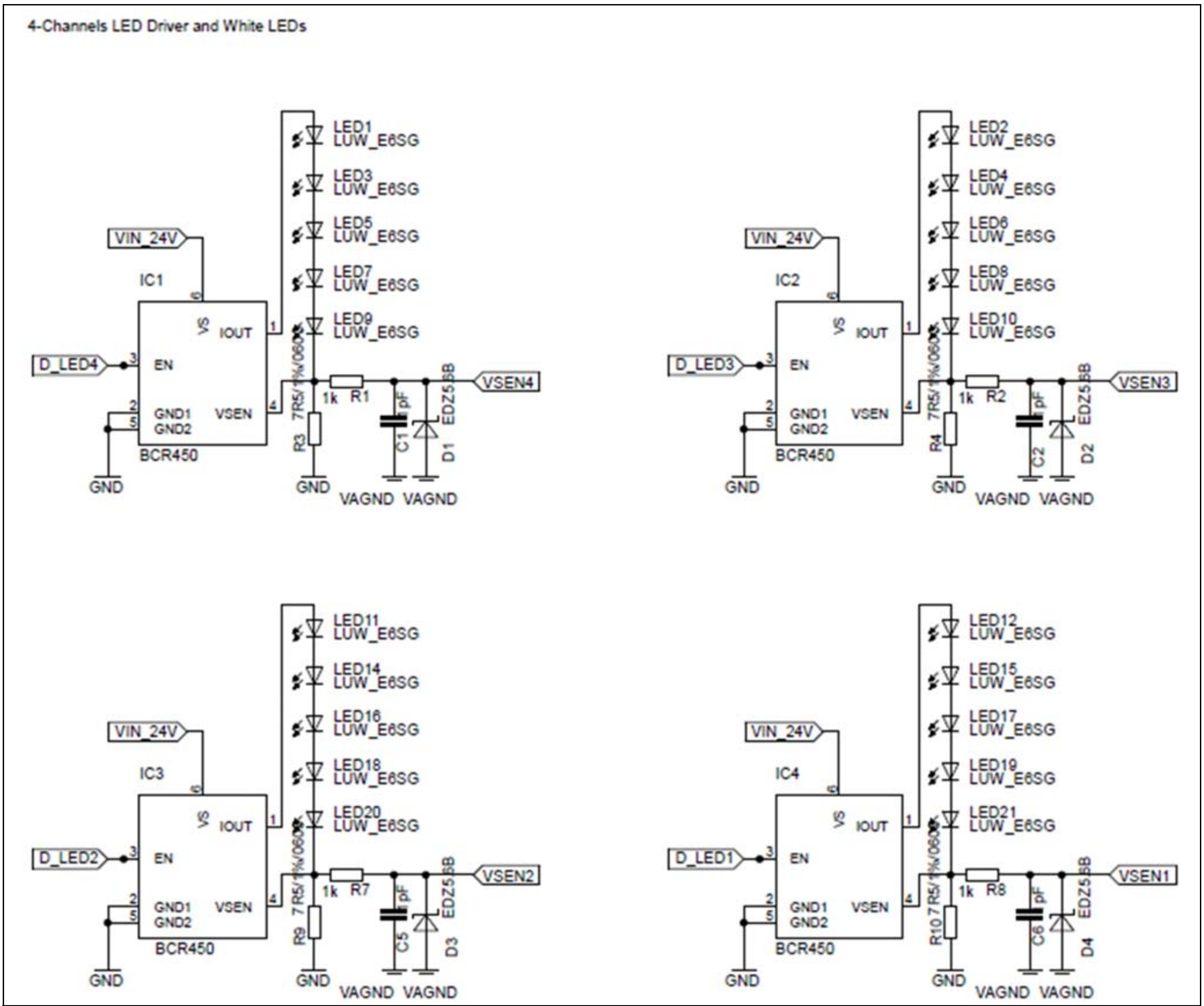


Figure 3 4 channels from BCCU module to control the brightness of 4 White LED strings

Table 1 shows the connection of the BCCU signals to the samtec 2x30pins connector.

Table 1 BCCU signal connection to the SAMTEC 2x30pins Connector

Pin No.	Signal Name	Description
27	D_LED1	BCCU output signal
29	D_LED2	BCCU output signal
31	D_LED3	BCCU output signal
33	D_LED4	BCCU output signal

2.2 Digital Addressable Lighting Interface (DALI)

The White LED Card supports DALI interface on board with two optocoupler (SFH6186-2) which provide level shifting and voltage isolation between the DALI network and the microcontroller's power supply. The DALI connector X3 consists of a DATA+ and DATA- signal pair.

Note: Please remove R105 on XMC1200 CPU Card to receive DALI data.

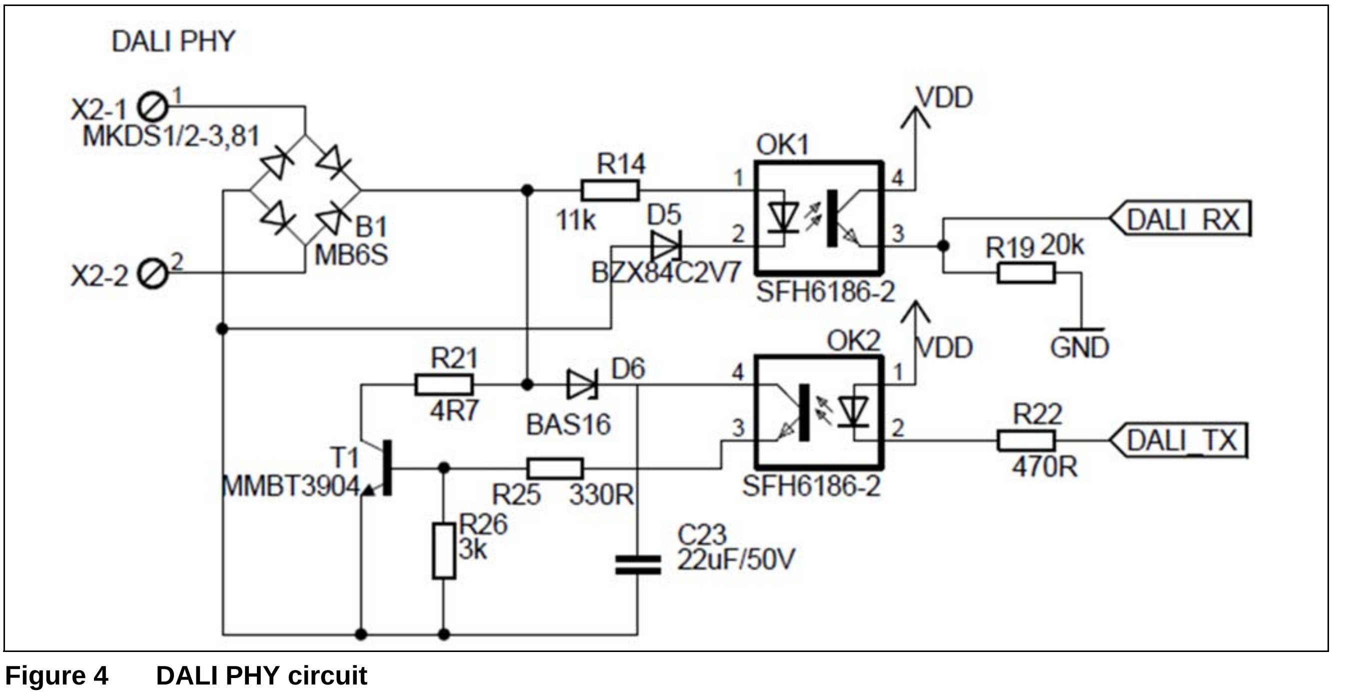


Figure 4 DALI PHY circuit

Table 2 DALI signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
21	DALI_RX	Receive DALI data
23	DALI_TX	Transmit DALI data

2.3 Temperature Sensor

The White LED Card supports Temperature Sensing on board with a temperature-to-digital converter (LM75B). XMC1000 device on a XMC1200 CPU Card communicate with the temperature sensor via the I^2C bus. This temperature sensor can achieve a temperature accuracy of +/-2°C from -25 °C to +100°C.

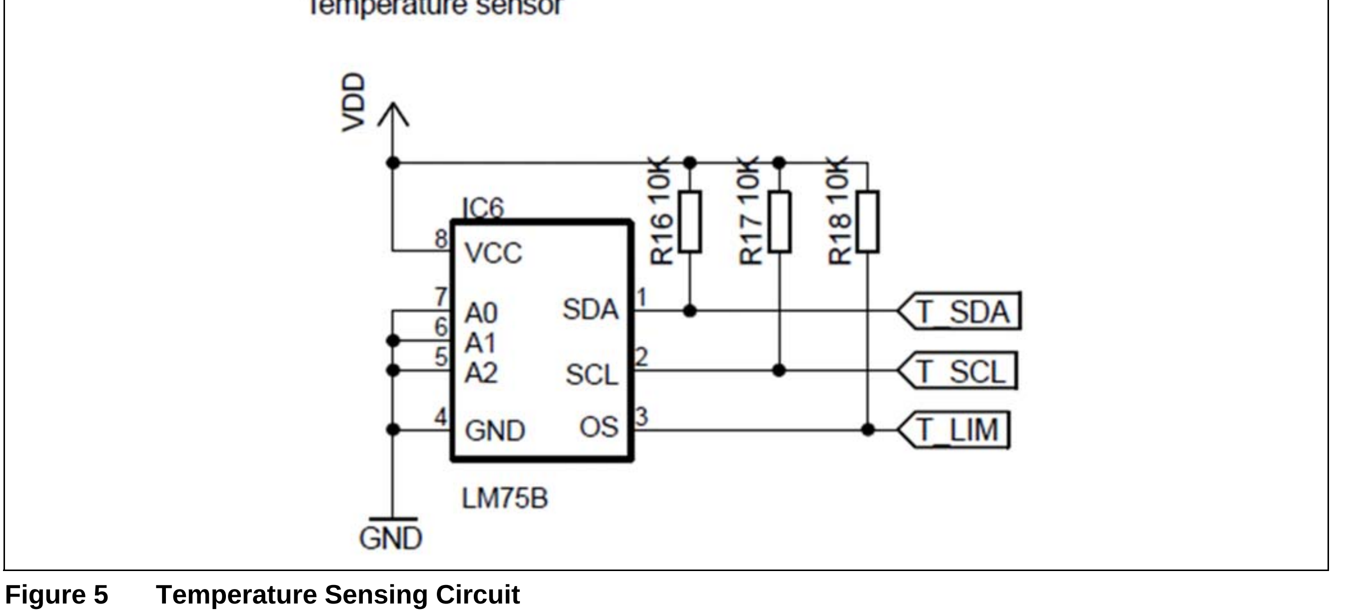


Figure 5 Temperature Sensing Circuit

Table 3 shows the connection of the I²C signals to the SAMTEC 2X30pins connector.

Table 3 I²C signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
10	T_LIM	Overtemperature shutdown
50	T_SCL	I²C serial clock
52	T_SDA	I²C serial bidirectional data

2.4 433MHz RF Receiver

The White LED Card supports 433MHz remote control system via a 433MHz RF Receiver (TDA7200) that is connected to the XMC1200 CPU Card through the SAMTEC 2x30pins connector.

Note: Please remove R104 on XMC1200/XMC1300 CPU Card to receive RF data.

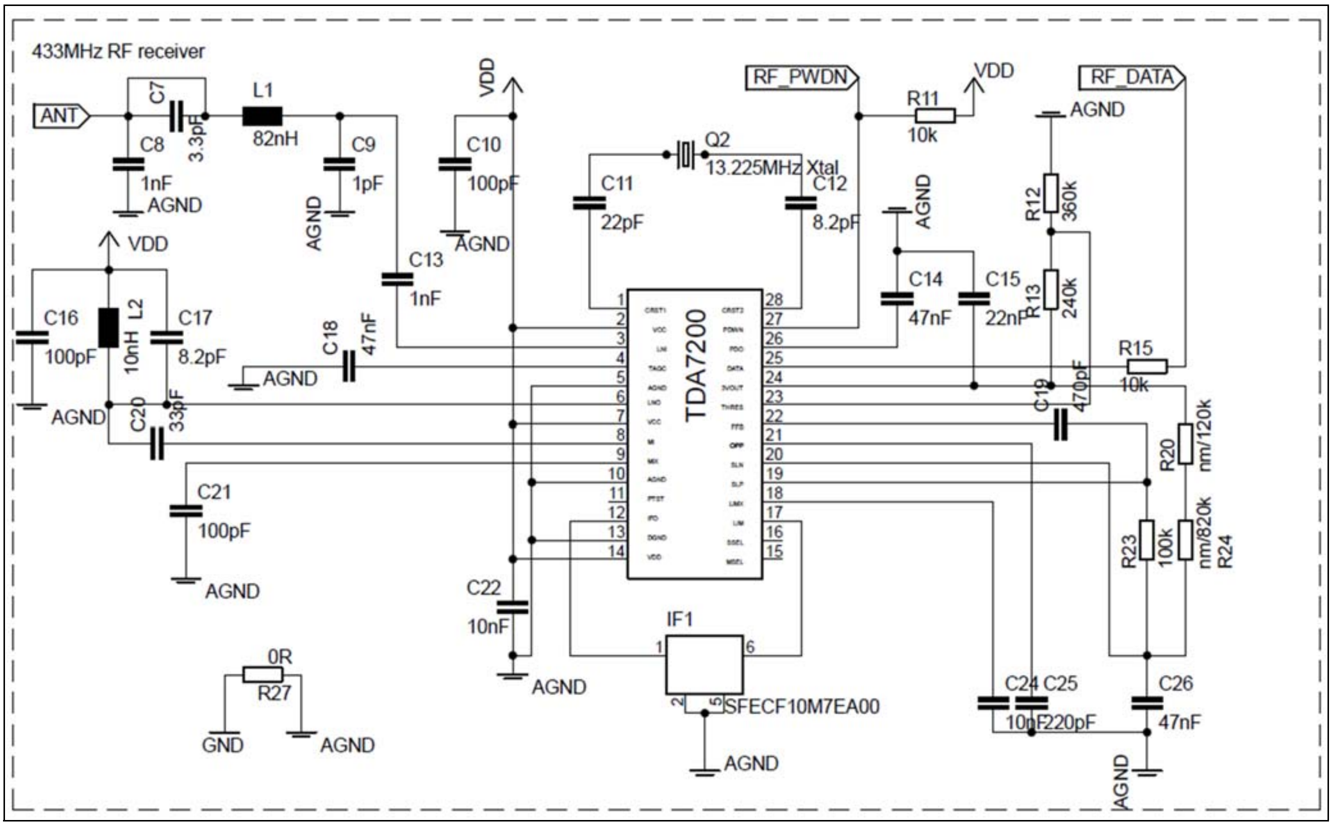


Figure 6 433MHz RF receiver circuit

Table 4 433MHz RF receiver signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
17	RF_DATA	RF Data In
43	RF_PWDN	Tied 'High' to enable RF Receiver

2.5 Light Sensor

The White LED Card supports ambient light sensing on board with NPN Phototransistor (SFH3710). The voltage output AMB_LT will be measured by the ADC module.

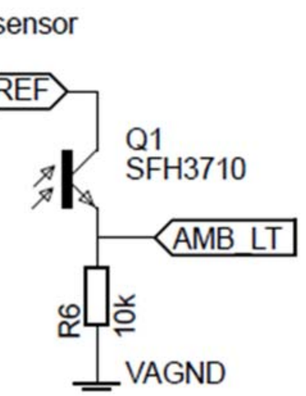


Figure 7 Ambient Light Sensing Circuit

Table 5 shows the connection of the Light sensing signals to the SAMTEC 2X30pins connector.

Table 5 Light sensing signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
2	AMB_LT	Light sensor analog voltage output

2.6 Power

Power input (5V) to the White LED Card is supported through the SAMTEC 2x30pins connector. VAREF and VAGND supply power to 433MHz RF Receiver and Light sensing transistor. VDD and GND provide power to DALI and the rest of circuitry.

External power connector J1 supply +24V DC to the four LED Driver ICs.

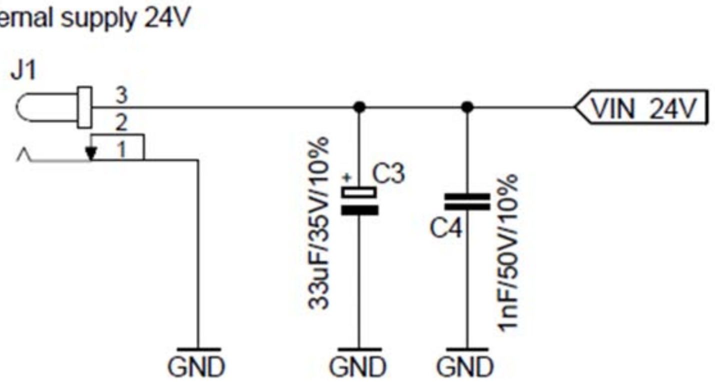


Figure 8 VIN_24V External Power Supply

Table 6 Power and ground signals connection to the SAMTEC 2x30pins connector

Pin No.	Signal Name	Description
13	VAGND	Analog ground
14	GND	Digital ground
15	VAREF	Analog VDD +5V
16	VDD	Digital VDDP +5V

2.7 Error Indicating LED

The White LED Card supports a red LED indication on board with signal from GPIO Port pin of the XMC1200 device on the XMC1200 CPU Card for user application usage.

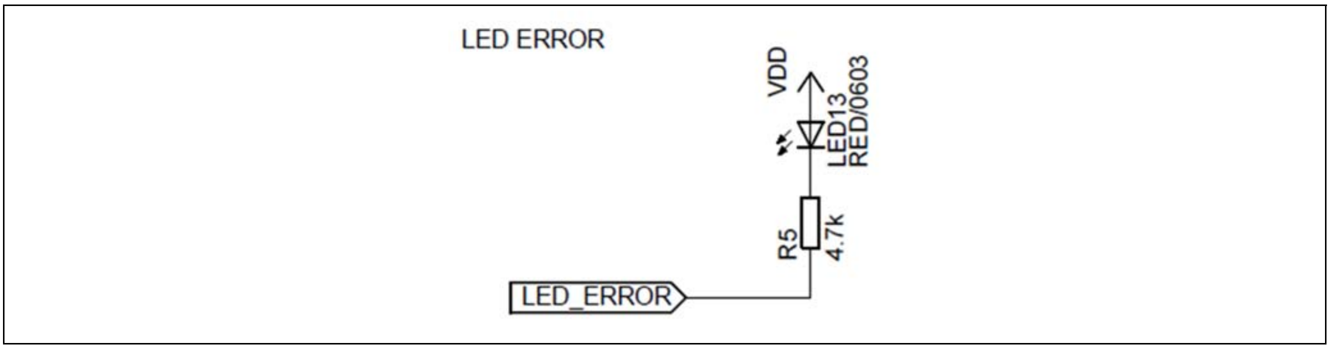


Figure 9 Error Indicating LED

Table 7 shows the connection of the Light sensing signals to the SAMTEC 2X30pins connector.

Table 7 LEDTS signal connection to the SAMTEC 2x30pins connector

Pin No.	Signal	Description
46	LED_ERROR	LED signalling

2.8 2x30pins SAMTEC connector

The SAMTEC connector of the White LED Card interfaces its signals to a XMC1200 CPU Card.

XMC1200_TSSOP38 Board>>	P2.11	P2.10	P2.9	P2.8	P2.7	P2.6	VSSP	VDDP	P0.8	P0.9	P0.10	P0.11	P0.12	P0.13	P0.14
XMC1200_TSSOP38 Board>>	SH0.IN3		SH0.IN2	SH0.IN1	SH1.IN1	SH0.IN0	VSSP	VDDP							
CONpins>>	AMB_LT		VSEN2	VSEN3	T_LIM	VSEN4	GND	VDD							
White LED Card	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
White LED Card	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
CONpins>>			VSEN1				VAGND	VAREF	RF_DATA		DALI_RX	DALI_TX		D_LED1	D_LED2
XMC1200_TSSOP38 Board>>			SH0.IN7				VSS	VDDP	CCU4.OUT0		CCU4.OUT2	CCU4.OUT3		BCCU.OUT1	BCCU.OUT2
XMC1200_TSSOP38 Board>>	P2.0	P2.1	P2.2	P2.3	P2.4	P2.5	VSS	VDDP	P0.0	P0.1	P0.2	P0.3	P0.4	P0.5	P0.6

XMC1200_TSSOP38 Board>>	P0.15	P1.5	P0.9	P0.10	P1.4	P1.3	P1.2	P1.1	P1.0	P2.0	P2.1	P1.1	P0.0	P0.6	P0.7
XMC1200_TSSOP38 Board>>								P1.1		U0C0.SCL	U0C0.SDA				
CONpins>>								LED_ERROR		T_SCL	T_SDA				
White LED Card	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
White LED Card	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
CONpins>>	D_LED3	D_LED4					RF_PWDN								
XMC1200_TSSOP38 Board>>	BCCU.OUT3	BCCU.OUT4					LTS0.C2								
XMC1200_TSSOP38 Board>>	P0.7	P0.8	P0.9	P0.10	P0.11	P0.12	P0.13	P1.1	P0.15	P1.0	P1.1	P1.2	P1.3	P0.8	P0.9

Figure 10 2x30pins SAMTEC connector

3 Production Data

3.1 Schematics

This chapter contains the schematics for the White LED Card:

- SAMTEC Connector, Power, 4 channels LED driver, DALI interface, 433MHz RF Receiver.

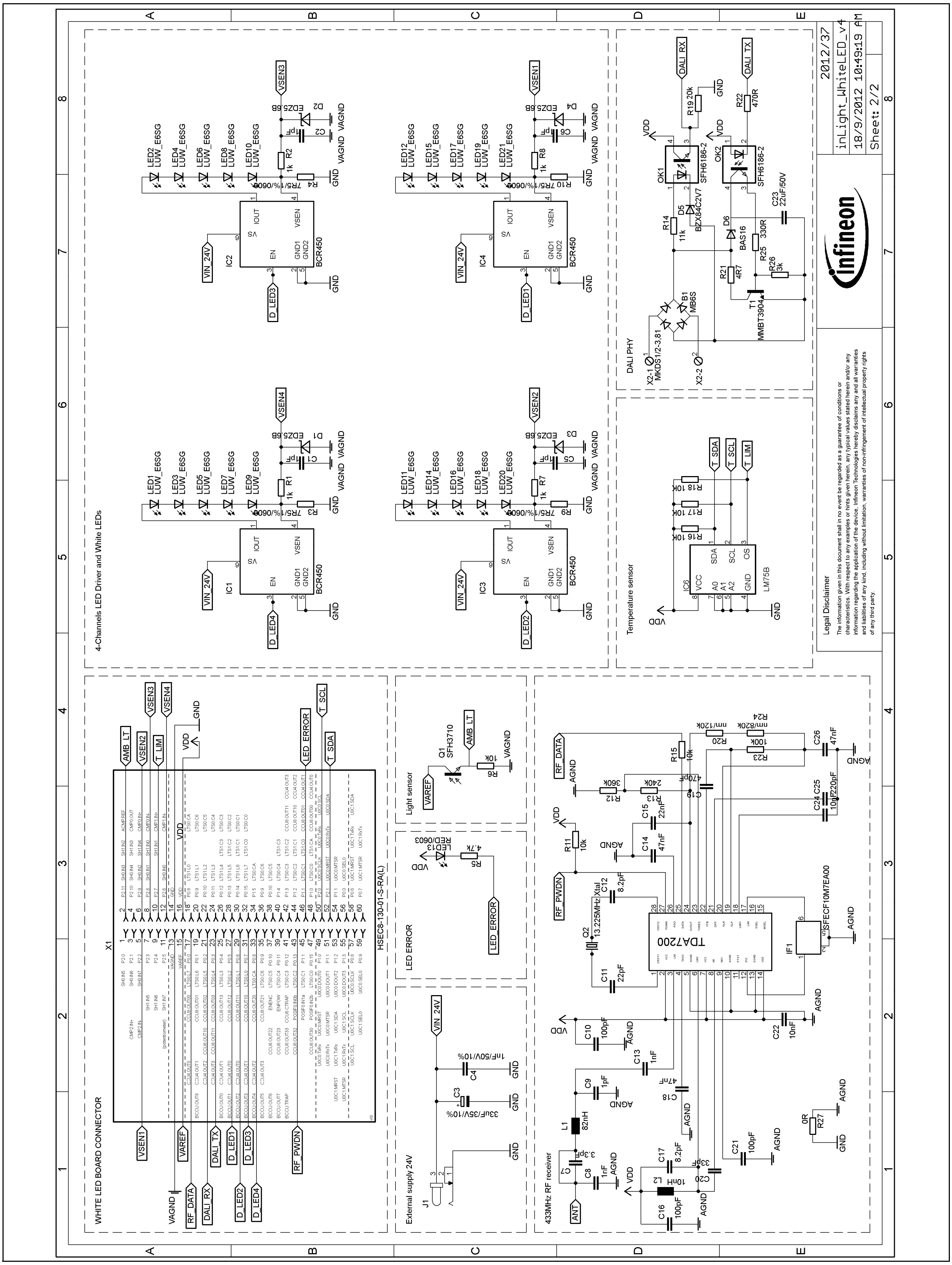


Figure 11 Schematic of White LED Card

3.2 Layout and Geometry

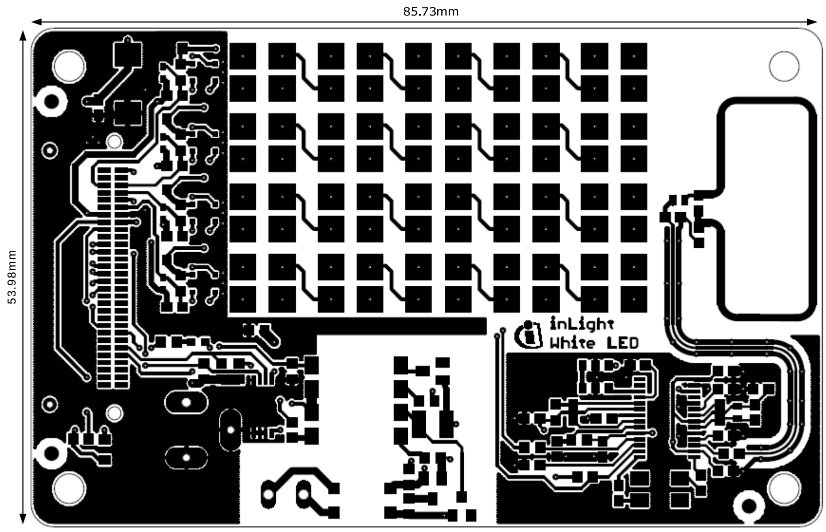


Figure 12 White LED Card layout and geometry

3.3 Bill of Materials

Table 8 White LED Card BOM

Sl. No.	Qty	Value	Device	Reference Designator
1	5	1pF/10V/10%/0603	Capacitor	C1,C2,C5,C6,C9
2	1	3.3pF/10V/10%/0603	Capacitor	C7
3	2	8.2pF/10V/10%/0603	Capacitor	C12,C17
4	1	22pF/10V/10%/0603	Capacitor	C11
5	3	100pF/10V/10%/0603	Capacitor	C10,C16,C21
6	1	220pF/10V/10%/0603	Capacitor	C25
7	1	470pF/10V/10%/0603	Capacitor	C19
8	3	1nF/50V/10%	Capacitor	C4,C8,C13
9	2	10nF/10V/10%/0603	Capacitor	C22,C24
10	1	22nF/10V/10%/0603	Capacitor	C15
11	1	33pF/10V/10%/0603	Capacitor	C20
12	3	47nF/10V/10%/0603	Capacitor	C14,C18,C26
13	1	22uF/50V/10V/10%/1210	Capacitor	C23
14	1	33uF/35V/10%/SMC_D	Capacitor	C3
15	4	EDZ5.6B	Zener Diode	D1,D2,D3,D4
16	1	BZX84C2V7	Zener Diode	D5
17	1	BAS16	Diode	D6
18	4	BCR450	LED driver	IC1,IC2,IC3,IC4
19	1	TDA7200	RF Receiver, Infineon	IC5

Sl. No.	Qty	Value	Device	Reference Designator
20	1	LM75B	I2C, temp. sensor	IC6
21	1	SFECF10M7EA00	IF filter	IF1
22	1	SPC4077	DC Power Jack	J1
23	1	10nH/0603	Inductor	L2
24	1	82nH/0603	Inductor	L1
25	20	LUW_E6SG	White LED	LED1-12, LED14-21
26	1	RED/CHIPLED/0603	Red LED	LED13
27	2	SFH6186-2	Optocoupler	OK1,OK2
28	1	13.225MHz Xtal	Crystal	Q2
29	1	0R/0603	Resistor	R27
30	2	4R7/0603	Resistor	R21
31	4	7R5/1%/0603	Resistor	R3,R4,R9,R10
32	1	330R/0603	Resistor	R25
33	1	470R/0603	Resistor	R22
34	4	1k/0603	Resistor	R1,R2,R7,R8
35	1	3k/0603	Resistor	R26
36	1	4.7k/0603	Resistor	R5
37	6	10k/0603	Resistor	R6,R11,R15,R16,R17,R18
38	1	11k/0603	Resistor	R14
39	1	20k/0603	Resistor	R19
40	1	100k/0603	Resistor	R23
41	1	240k/0603	Resistor	R13
42	1	360k/0603	Resistor	R12
43	1	nm/120k	Resistor	R20
44	1	nm/820k	Resistor	R24
45	1	MMBT3904	Transistor	T1
46	1	HSEC8-130-01-L-RA	SAMTEC connector	X1
47	1	MKDS1/2-3,81	DALI connector	X2

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